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DATE: Saturday, September 30, 2006 **Purge Queries** Printable Copy Create Case

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	DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR		
L25	705/70	101	L25
L24	705/79	236	L24
L23	705/77	208	L23
L22	705/73	78	L22
L21	705/72	196	L21
L20	705/62	215	L20
L19	705/58	370	L19
L18	705/56	278	L18
L17	705/53	426	L17
L16	705/34	796	L16
L15	705/33	129	L15
L14	705/23	522	L14
L13	705/21	553	L13

L12	705/39	2006	L12
L11	705/40	1678	L11
L10	705/42	704	L10
L9	705/35	2657	L9
L8	6494367.pn.	2	L8
L7	5884271.pn.	2	L7
L6	4918631.pn.	2	L6
L5	L4 and (coded or cod$ or coding) near (forms or documents)	64	L5
L4	l1 and (sensing or sens$ or electronic) near (device or pen)	229	L4
L3	L2 and (bank$ with transaction or bank$ near transaction or banking adj transaction)	68	L3
L2	L1 and (coded or cod$ or coding) near forms	93	L2
L1	(online or on-line or internet or www)near banking	2110	L1

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L3: Entry 68 of 68 File: USOC Mar 7, 1967

DOCUMENT-IDENTIFIER: US 3308439 A
TITLE: On-line system

OCR Scanned Text (11):
United States Patent Office 3,308,439 Patented Mar. 7, 19672 3,308,439 the important objectives of su-ch a system at reasonable ON-LINE SYSTEM ek, cos t and with a minimum of equipment. Robert M. Tink, Redondo Beach, Robert A. Meini An other object of the invention is to provide an on-line Los Angeles, and Frank B. Andrews, Jr., Gardena, b anking system which requires a minimum of storage at Calif., assignors to The National Cash Register Com. 5 e ach branch of a multi-branch bank system. pany, Dayton, Ohio, a corporation of Maryland A further object of this invention is to provide, in Filed Jan. 2, 1964, Ser. No. 335,184 a ccordance with any or all of the foregoing objects, an 13 Claims. (Cl. 340- 172.5) o n-line banking system in which off4ine operations can T'his invention relates generally to data processing sys- c onveniently be handled in the event the data processor 10 or the com muni catio n equi pnie nt asso ciate d ther ewit h is tems and more particularly to data processing devices in- n ot operating, and in which such off-line operations can tended for use in the banking field. c onveniently be entered into the data processor at a later In the past decade there has been an upsurge in the use ti me for handling with previous or future on-line data. of banking services with more depositors, more borrowers Still another object of the present invention is to pro- and more special services being provided by banks each 1,5 v ide, in accordance with any or all of the foregoing ob- year. In many cases, the paperwork related to these j ects, an on-line banking system which permits a reduction services has increased disproportionally, with the result i n the customer waiting time at the teller's window. that banks have been forced to hire additional people S till another object of the present invention is to pro- and obtain additional floor-space in an attempt to maid- v ide a system, in accordance with any or all of the fore- tain adequate customer services. To eliminate some of these problems, more and more banks have been looking 20 g oing objects, which prevents undetected errors from occurring towards the fast -rowing electronic data processing f ield to provide a solution to these problems. Early application of data processing to the banking field involved the tise of teller window ma-chines which, 25 in addition to the normal activities of updating a cus_ tomer' s passbook and providing a journal tape for audit- in.- purposes, also simultaneously punched a paper tape which could be removed from the window machine and fed to a data processor for accounting purposes. While 30 this early approach was a help in alleviating the paper work and employee time involved in keeping banking record s current, many of the bank's problems remained unsolv ed. For example, the teller still had to manually post the interest to the customer's passbook from an in- 35 terest card provided by the back office at the end of each period . Also, the teller still had no convenient access to the bank's record of accounts for reference purposes and it was necessary to provide account files on the floor which he could refer to when necessary. To provide a more complete solution to such banking 40 proble ms, more and more banks have been turning to what is commonly referred to in the computer art as an on- line system. From the banking point of view, an on- line system is one in which a teller, using an appropriate 45 windo w machine, is able to send and receive information from a remotely located data

processor while the customer is actually at the teller's window. In such a syste-m the custom er's transaction (such as a deposit or a withdrawal) is fed via the window machine to the data processor which Thus, the has full information of the customer's account. r'O data processor can provide any appropriate information to the teller as well as causing proper updating of the cus- tomer' s passbook, all without the teller having to leave the window. 55 It will be appreciated that there are many possible ap- proac hes to the design of an on-line banking system. Obvio usly, if unlimited funds are available a highly so- phisti,c ated and very rapid system can be devised in accord- ance with presently known techniques so as to provide an 60 on- line banking system having all the -capabilities and speed that a bank might desire. However, as always, cost is a vital consideration so that a practical system must necess arily be a compromise between cost @nd function. In accordance with the present invention an on-line 65 system is provided which meets the important objectives of an on-line banking system at reasonable cost and with a minimum of required equipment and, in addition, pro- vides a number of unique and highly advantageous features. 70 Accordingly, it is a broad object of the present inven- tion to provide an on-line banking system which achieves data processor. either at the teller window machine or at the Yet another object of the present invention is to provide an on- line banking system, in accordance with any or all of the foregoing objects, in which the operations required of the teller are essentially the same during both on4ine and off-line operations. A still further object of the present invention is to provide an on-line banking ssytem, in accordance with any or all of the foregoing objects, in which errors will not be printed out on the customer's passbook. Yet a further object of the present invention is to provide an on- line banking system, in accordance with any or all of the foregoing objects, in which previous unposted information (such as interest and no book transactions) can be posted on the first Presentation of the customer's passbook. Still aiiother object of the invention is to provide an on-line banking system, in accordance with any or all of the foregoing objects, in which current balances and account conditions are made available to any teller's window. An additional object of the invention is to provide an on-line banking system, in accordance with any or all of the foregoing objects, in which the required changes in the operation and construction of conventionally available window machines for use with the system are reduced to a minimum. Another object of the invention is to provide an on- foregoing objects, in which messages frorn either the line banking system, in accordance with any or all of the window machine or the data processor are divided into convenient message segments, these message segments being appropriately time-multiplexed by the system so as to increase the speed capabilities thereof with a minimum of required information storage. A still further object of the invention is to provide an on-line banking systern, in accorda-iiee with any or all of the foregoing objects, in which a variable trans. . mission rate capability is provided for information fed from the data processor to the bank branches so as to permit slower operating mechanisms (such as are present in the window machine) to be satisfactorily operated, while permitting faster operating devices to receive information at a faster rate, thereby providing a higher average operatit-ig speed for the system. Yet a further object of the present invention is to provide an on- line banking system, in accordance with any or all of the foregoing objects, in which a minimum of telephone lines are required between each bank branch and the bank's central accounting location.

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3 The specific nature of the invention as well as other objects, advantages and uses thereof will become apparent froni the following description taken in conjunction with the accompanying drawings in which: FIG. 1 is a schematic overall view of a typical online banking system in accordance with the present invention; FIG. 2 illustrates a typical set up at a branch; FIG. 3 is a pictorial view of a typical window machine; FIG. 3a is a view of the keyboard of the window machine of FIG. 3; FIG. 4 is a schematic electrical diagram illustrating the keyboard switches incorporated in the window machine of FIG. 3 for use in reading olit a keyboard entry; FIG. 5 is a schematic electrical dia.-ram illustratin.the keyboard solenoids

incorporated in the window machine of FIG. 3 for use in setting the keyboard in accordance with electrical signals derived from a data processor; FIG. 6 is a fragmentary cross-sectional view illustratin- how the window machine of FIG. 3 may be prolided with a double keyboard to permit operation of the window rnachine in a similar manner whether by an bperator or by electrical signals derived from a data processor; FIGS. 7 and 8 respectively illustrate a typical format for input and output message segments transmitted between the central accounting location and each branch; FIG. 9 (which is constituted by FIGS. 9a and 9b) is a schematic electrical block and circuit dia.-ram illustrating a typical logical mechanization of a wi@idow niachine and its associated electronics unit; FIG. 10 (which is constituted by FIGS. 10a and 10b) is a schematic electrical block and circuit dia-ram fllustratin.@ a typical logical mechanization Of a branch controller; and FIG. 11 (which is constituted by FIGS. Ila and llb) is a schematic electrical blor@k and circuit diagram illustrating a typical logical mechanization of a buffer at the central accounting location. INTRODUCTION An overall schematic view of a typical on-Iiiie bankin-, system in accordance with the present invention is illustrated in FIG. 1. It will be seen that the system broadly comprises a central accounting location 10 communicating with a plurality of bank branebes 20 by means of telephone lines 20a. At the central accounting location 10, a data processor 12 is piovided cooperating with a random access unit 13 which provides rapidly accessible high capacity storage for information concernii-ig custonler accouiits. A buffer 15 is provided between the data processor 12 and the telephone lines 20a to control the flow of information between the bank branches 20 and tl-le data processor 12. While oiily three branches and one buffer 15 are shown in FIG. 1, it will be appreciated that additional branches and buffers could also be employed. Still referrin.@ to FIG. 1, it will be seen that at cach of the bank branches 20, a plurality of window machines 40 serve as the input-output point of origin device for each teller. Each window machine 40 is connected to a respective electronics unit 40a by means of which it is able to communic,,ite with a branch controller 30. The branch controller 30 is in turn connected to its respective branch telephone lines 20a and serves to control communication between the window machines 40 at the branches 20 and the buffer 15 at the central accountinlocation 10. FIG. 2 illustrates how the equipment at a branch may typically be set up. In the exempla:ry embodiment of the invention to be considered herein, there is essentially no message storage at the branch other than that provided by the window machines themselves, and each branch coritroller 30 per- 3,308,439 4 mits only one window machine at a time to communicate with the buffer 15 at the central accountin.- 10. The operation of the buffer 15 is such that, at any one time, the buffer can communicate with either a selected win- dow machine of a selected branch, or with the data processor 12, but not both at the same time. Such restrictions are of considerable help in reducing the system eqliipment and cost requirements. As will hereinafter become evident, the present invention makes it possible 10 to provide an efficient and siifficiently fast system despite these restrictions. While various types and forms of equipment can be employed in the on-line bankiiig system of the present invention, some exemplary equipment may be r.,ientioned 15 which are well suited for use in various parts of the system. For example, the data processor 12 at the central accounting location 10 in F'IG. I niay be of the type disclosed in the conimonly assigned copending patent application Serial No. 107,109, filed May 2, 1961, while the 20 random access stora.-e unit 13 in FIG. I may be of the type disclosed in the commonly assigned copending applications Serial No. 12,032 and Serial No. 162,626 respectively filed on March 1, 1960 and December 8, 1961. 25 THE WINDOW MACHINE The window machine 40 indicated in FIGS. I and 2 is preferably of the type illustrated and described in U.S. Patent No. 2,774,298, issued to Everett H. Placke et al. on December 18, 1956, which has long been used by a 30 nurnber of savings banks to record the deposits and withdrawals of their customers. Since this window machine is fully disclosed in the aforementioned patent, it will only be considered very generally herein, it being understood that the window machine of the present invention 35 may be similarly provided, except for various mc)difications desirable for incorporation of the machine into an on-line system, A typical -manner in which these modifications may be provided is illustra*ed and disclosed in the copending commonly assigned U.S. patent applica- 40 tion Serial No. 308,382, filed September 12, 1963. FIGS. 3 and 3a illustrate a window macbine 40 of the type disclosed in the just mentioned cgpending application Serial No. 308,382. A sloping keyboard 41 contains the nine rows of amount keys 120, the four rows of control 45 keys 122, and three groups of indicator lamps indicated at 125. Beiieath the keyboard 41 at the front of the inachine is a printidg table 43 to accommodate the customer's passbook. To the left of the printing table 43 is another printin.- table 44 to accommodate the transaction slip 50 which is filled out by the customer prior to stepping up to the teller's window. To the right 6f the printing table 43 in the window machine is another printing mechansm for printing on an audit strip wbich is visible through a window 45. This audit strip is retained in the 55 machine aiid all entries in the window machine are printed thereon for auditing, purposes, while only selected entries are printed on the customer's passbook and the transaction slip. As in the aforementioned Placke et al. patent, the window machine also includes an add-subtract total- 60 izer which allows the printing of proper balances, whether they be positive or negative, or whether a deposit or a withdrawal is be;ng- entered. More recent window machines of the general type disclosed in the aforementioned patent bave provision to 65 permit information entered into the keyboard@to be electronically scanned to cause a paper tape to be punched in response thereto. This is a w@-11 known feature of many types of accounting machines and may advantageously be employed in the present invention to permit read out 70 of information entered into the window macwne, A typical manner in which this is accomplished is scbematically illustrated in FIG. 4 in which each keyboard switch illustrated therein corresponds to a respective key: in the keyboard 41 of FIGS. 3 and 3a; only the first two, 75 rows and the last row of leyboard switches are shown ia

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@eed the outptit message binary coded digit by binary coded digit (along with the scan position number of the brar@ch for which the output message segment is intended) to the buffer 15 where it is stored in the buffer register. (4) After bein.- loaded with an output message segm@ ent from th-, processor, the buffer s-- nds a REQUEST TO O'CJTPUT control signal to branch #I and the processor is released to perform other activity; however, the processor s'lill retains the output message segment just sent until it receives an indication from the buffer that th- @ outp,,it niessage segment was properly received by the window maci-i-'no. (5) Without waiting for an answer from branch #11 the buft'er 15 sends an output message segment of 18 bin-@iry coded di.-its of seven bits each to branch #1, the first digit of which corresponds to the scan position of -window machine #1 and causes the controller 30 of branch #1 to try and select window machine #1. A typical oulput message segment is illustrated in FIG. 8. It will b.- noted that this typical output message segment is similar to the input messaae segment of FIG. 7, except for digit positions 12 and 13. In the input message segment, digit positions 12 aid 13 are used to identify the window machine. In the output message segment, digit position 12 controls the window machine keyboard lights 125 (FIG. 3), and digit position 13 controls what type of automatic second cycle is to be provided-such as a balance cyc'@e at the end of an output message, or a subbalance cycle at the end of an output message segment where other output message segments are still to follow. (6) When the branch #1 controller tries to select window machine #1 in response to receivin.- the window machine scan position, there are various possible situations that can occur as indicated by (a) and (b) below: (a) If window machine #1 is ready to accept an entry when the controller tries to select window machine #1 in response to the scan position number in digit position I of the output message, then selection occurs and the window machine keyboard solenoids (FIG. 6) are set in accordance with respective digits of the output message se.-Ment, the buffer providing a sufficient time interval after the transmission of keyboard di.-its so as to give the keyboard solenoids a sufficient chance to operate. Since zero di,@its as well as other non-solenoid digits do not require solenoids to be set, no -such waiting interval is provided. In order to

give the controller 30 a chance to fully check the parity of the output message segment sent by the buffer, activation of the solenoid corresponding to the key wbich will initiate a window macbine cycle (stich as the keys in control row 3 in FIG. 3a) is delayed until parity is checked. If parity checks out okay, a MESSAGE O.K. signal is sent by the controller 30 to the buffer 15 which causes the buffer 15 to notify the ptocessor that the outpiit message segrnent was properly received by window machine #1, the buffer then releasing to attend to other branches. A correct parity check also pidrmits the controller to activate the remaining cycleinitiating solenoid of window machine #1, causing the witidow machine to cycle and the controller 30 to be released to atte,.id to other window machines. A second cycle is then automatically initiated by the electronics unit 40a of window machine #1 by causing depression of an appropriate cycle-initiating key (such as the SUB BALANCE or BALANCE key) in accordance with the automatic cycle digit in digit position 13 of the output messa,@e segment. An appropriate lamp in the window machine.keyboard may be illuminated as determined by the lamp information in digit position 12 -of the output message segment. (b) If wi@-idow macbiie #1 is busy when the controller t.-ies to select window machine #1 in response to receivin.a the window machin-- scan position in digit position I (FIG. 8), or if the coiitroller finds a parity error, then the branch #1 controller will send a MESSAGE 8,308,430 14 ERROR control signal to the buffer 15 which causes the buffer to signal the processor that the output message segment could not be received by window machine #I, whereupon the processor releases to attend to other win- 6 dow machines, or to do other work, and will not try to send this same output message se,@ment for a predetermined time. If a parity error caused the MESSAGE ERROR control signal to be sent by the controller, an appropriate lamp on the keyboard of window machine #1 10 will be illuminated to inforin the teller that he should depress the VOID key in order to wipe out any portion of the output message segment which was entered in the window machine keyboard by the processor. (7) Any other output message segments from the 15 processor are handled in the same manner as just described above. As far as a particular window machine is concerned, it recognizes the end of an output message, (which may consist of a plurality of output message segments) as a result of the BALANCE key being activated 20 in accordance with the automatic cycle digit in digit position 13 of an output message segment. Thus, the signal which causes depression of the BALANCE key signifies the end of an output message jtist as a signal derived froni depression of an account number key (such as A AC- 25 COUNT NUMBER) signifies the end of an input message. Illustrative system mechanization An illustrative system mechanization will now be presented to show how the previously described operations 30 can be mechanized. It will of course be appreciated that logical functions and operations can be mechanized in many different ways. From the viewpoint of the present invention, the invention resides primarily in the discovery of the type, order, arrangement and character of the par- 35 ticular functional operations which will give the most advantageotis on-line banking system (as described previously herein), and not in the detailed logical rnechanization employed which may take various forms. Consequently, wherever possible, well-known block represen- 40 tations will be employed rather than specific structure or circuitry in order not to obscure the description with insignificant details. Also, only the mechanization - required for a typical situation@will be shown, since this will serve as a sufficient illustration of mechanization, it being un- 45 derstood that many variations are possible, and that- additional logical functions and operations may be added as desired. The illustrative mechanization will be presented in two parts. The first part will consider the mechanization at 50 a typical branch using FIGS. 9 and 10. FIG. 9 illustratcs a window macbine 40 and its associated electronics unit 40a, and FIG. 10 illustrates a branch controller 30. The second part will consider the mechanization at the central accounting location using FIG. I 1 which- illustrates a 55 typical buffer 15. It will be noted that each of FIGS. 9, IO and II require two sheets, the respective figures being designated as 9a and 9b corresponding to FIG. 9, 10a and 1,Ob corresponding to FIG. 10, and Ila and llb corresponding to FIG. II. 60 Some initial points conceming various conventions used in FIGS. 9-11 will be helpful in understanding the des@eription to follow. First, it will be noted that, in addition to the use of various labeled block representations in FIGS. 9-14, conventional AND and OR gates are ap- 65 propriately illustrated as semicircles, a "pl@us sign" in the semicircle indicating an OR gate, and a "dot" in the semicircle indicating an AND gate. As is well known, an OR gate will provide a true output when any of its inputs are true, while an AND gate will provide a true output 7o offly when all of its inputs are true. When many related gates are involved, they are represented in a single block for the sake of simplicity (such as the inpiit message gates 200 in FIG. 9a), the enabling signals for such block-represented gates (such as 210a in FIG. 9a) being 75 applied to the block perpendicularly to the data and other

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17 rest count OPO), then both IPO and OPO will be true to cause pulses from a scan clock 301 (which may typically run at 2,000 cycles per second) to be applied (through AND gate 303 and OR -ate 304) to the "count" input of a scan counter 302. The scan counter 302 is provided with eight scai counts IS, to IS8 (one for each window machine) which become true in sequence as the scan counter 302 counts in response to the appl;ed pulses from the scan clock 301. These scan output counts IS, to ISB are fed from the branch controller 36@'@ to respective ones of the eight window machines 40 via their respective electro,nics iinits 40a, as indicated in FIG. 9ci for the window machine corresponding to scan count IS,. As typically illustrated in FIG. 9a, each wiridow rnachine 40 is provided with a "ready to inpiit" switch 150 which will be closed o-.ily if the resr)ective window machine is ready to input-that is, if an entry made by the teller is in the keyboard switches (FIG. 4) waiting to be read otit. Thus, assumin.- that the window machine illustrated in FIGS. 9a and 9b, is ready to input so tliat, the ready tO input switch 150 is closed, then, when the scan counter 302 (FIG. 10a) causes scan count IS, to become true, the clos--d ready to irput switch 150 will feed the true count IS, back along line IM, to the branch controller 30 (via its respective electronics unit 40a) to cause the input pro,-ram counter 31@10 (FIG. 10a) to be advanced from IPO to the next pro,@rani count IP, (a.-a'ln assurlin,@ that output prograrn counter 320 i-.i FIG. 10b is in rest count OPO). The advance of the input pro.-ram counter 300 to IP, in respons,, to the returned true signal alon.- li-@ic IM, Occurs sufficiently fast so that the scan counter 302 is frozen in scan count IS,. 2. Program coitnt IP, Pro-ram count IP, is applied to a control signal genel, ator 307 (FIG. 10a) to,cause - eneration of a REQUEST TO INPUT control signal in binary coded form. This REQUEST TO INPUT control si.-nal is fed to a transniitter and converter 309 provided @at the branch for the purpose of transmitting si,@nals from the branch to the central accotinting location by way of the telephone lines 20a (FIG. 1) connected therebetween. The transmitter and converter 309 continuously provides clock pulses Ct (which may typically bave a repetition rate of 2,000 cycles per second) for the purvose of indicating when the transmitter and converter @-09 is ready ta receive a binary coded signal for transmission. These clock pulses Ct are fed to the control sianal generator 307 so that the R.EQUEST TO INPUT control signal can be fed to the trans@-nitter and converter 309 at the proper times during IPI. These same transmitter clock pulses are also fed to other log:tcal circuitry in the branch controller 30 to likewise control the time of feedin- of signals to the transmitter and converter 309. Also, these transmitter clock pulses Ct are preferably synchronized with the clock ptilses ckf the scan clock 301. Typically, the transmitter and converter 309 accepts the bits of each binary coded signal in parallel, and then converts the si,-nal to serial form for transmissioii in order to minimize the number of telephone lines required. The input program cou-@iter 300 remains in pro.@ram count IP, until an O.K. TO INPUT control signal is received by the branen from the central accounting location, again via the telephone lines 20a. As with all signals sent to the branch from the central location, the O.K. TO !NPUT conlrol si.,nal is received by a rec@-iver and cOnverter 311 (FIG. 10b) which receives and converts the signal from the serial form in which it is transmitted into binary coded form for use by the branch controller 30@. Also, one of the seven bits of each coded binary digit wbich is transmitted is used to identify whether the di.-it represents data (such as an amount row magnitude) or a control s@@,-nal (such as the O.K. TO INPUT control

signal). This identifying bit is used by the receiver and converter 311 to .@enerate either a data clock pulse Cd when the di-it received is a data si.-nal, or a control sign;@l 3,308,430 13 clock pulse C, wben the digit received is a control signal. These clock pulses C,, and Cd are used in properly directing a received binary coded digit appearin,@ at the output of the receiver and converter 311 to the remainder of the bre@nch. Also, it is preferable that the clock pulses C, and Cd be in synchronism with the clock pulses Ct produced by the transmitter and converter 309 (as indicated by interconnecting line 31loc)-that is, the clock ptilses may have differeiit repetition rates, but when they 10 do ocetir together they are in phase. Typically, the transmitter and coiiverter 309 and the receiver and converti@i 311 may employ what is known in the art as a Bell System Data Set 201A, which is a modulator-demodulator designed to transmit and receive data over a switched voice 15 freque@-icy telephone circuit or a private line at a-transmission rite of up to 2,000 bits per second. When the O.K. TO INPUT control signal is sent to the branch from the ceiitral location, it will be applied to the receiver and converter 311, which in tiirn will feed the 20 O.K. TO INPUT signal in binary coded form to a control character decoder 310 (FIG. 10b) activated by the control clock pulse C, produced by the receiv, r and converter 311 when the binary coded forni of the ri.K. TO INPUT appears at the output thereof. The contro@l character decoder 25 310 decodes the binary coded O.K. TO INPUT control si.-nal applied thereto, causing its respective O.K. TO INPUT outptit lin.- to become true to act through AND gate 313 to advance the input program counter 300 (FIG. 10,a) to its iiext program count IP2- 30 3. Progi-an7 cotttzt IP2 In addition to catising advancement of the 'input program counter 300 to IP2, the true O.K. TO INPUT si.-nal appearing at the otitput of the control character decoder 3' 310 (FIG. 10b) results in a true selection signal being sent (as a result of the action of AND gates 314 and 315 in FIG. 10a) over selection line IW, (FIG. 10a) to the electronics unit 40a (FIG. 9a) of the window machine 40 correspondin@ to the frozen scan count IS, of the scan cotinter 302. The triie si.-nal IW, turns on the input select flip-flop 210 (FIG. 9a) to enable t-he respective' in- plit message -gates 200 so as to establish ' during program count IP2, the communication required between the branch conlroller 30 and the selected window machine for trans- 45 mssion of the eighteen digit input message illustrated in FIG. 7 to the central accounting location. The first digit to 'be transmitted is the scan position of the selected window machine. This scan position digit is applied to the transmitt&r and converter 309 at the 50 next transmitter clock pulse Ct following the advancement of the input program counter 300 to IP2 using th@ scan counts IS, to ISB which are applied to respective AND -ates 321-32,8, whose outputs are in turn applied to decimal to @binary converter 325a activated by IP2 and 55 the transmitter clock pulses Ct. An input digit counter 330 (FIG. 10a) is initially at its first count ID, durin.- I.Po and is sequentially advanced through its counts ID,-ID,8 by transmitter clock pulses Ct occurring dtiring lP2. The digit counts ID,-IDA of the digit counter 330 60 a- used to identify the digits of the eigliteen digit input message segment as they are sent, and to energize the ap- propriate lo.-ical circfiitry for each di.-it. Thus, at the first transmitter, clock piilse Ct following advancernent of the input program counter 300 to IP2, the input counter 6,5 will still be in count ID, (since all covnters change only in response to the trailing ed,@e of -'-, inpiit true pulse as pointed out previously) so that AND gates 321- 3@28 will be.enabled to pass- the scan position information to the decimal to binary converter 325a and then onto the 70 transmitter and converter 309 as t e rst digit o input message segment. As indicated in FIG. 7, the next di-its of significance to be sent to the central location are digits 3-11 (the secoiid digit is blank), and this is accomplished as tlle 7,5 transmitter clock pulses Ct cause the input digit counter

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21 which is initially in digit count OD,. These digit counts OD,-ODIB are used to identify the digits of the eighte.-n digit output message segm,@:it (FIG. 8) as they are received, and to energize th.- appropriate corresponding lo.-ical circuitry for eacb digit, The data clock signals Cd are also used during OP, to

control the operatijn of a binary to decirt-ial converter 305 (FIG. 10b) which converts data signals from the ibinary coded form in which they appear at the output of the receiver and converter 311 into decimal form. The binary to d.-cimal converter 305 op--rates so as to retain each digit at its output tintil chan.-ed by the data clock signal Cd of th-. next digit. The first digit of the eighteen digit output message se-ment appearing during OP, is the scan position number of the window machine and occurs when the otitput digit ccunter 352 is still in its initial count OD,. Cons,-quently, the gates 351@ (FIG. 10b) are enabl.-d during receipt of this first digit to permit the binary to decimal converter 305 to cause a selected one of the eight selection lines OW, to OWB (one for each window machine) to become true. These selection lines OW, to OW8 are f.-d from the branch controller 30 to respective o-@ies of the eight window machines 40 via their respective electronics units 40a, as indicated in FIG. 9b for the windown machine correspond- @'ng to selection line OWI. As typically illustrated in FIG. 9b, each window machine 40 is provided with a "ready for output" switch 175 which will be clos.-d only if the respective window rnachine is ready for output-that is, if the teller has completed the input entries and the window machine is in a condition awaitin., an output message segment. Assumirg that the window machine illustrated in FIGS. 9a 'ind 9b is ready to accept an olitput (in which case the ready for -output switch 175 will be closed), then, when selection line OW, becomes true during OP, (in accorda-ice with the value of the first digit of the output message segment), a true signal will be applied tbrough switch 175 to turn on the respective output select flipflop 255 (FIG. 9b). The tuming on of flip-flop 255 enables the respective outptit message gates 230 to thereby establish, during OPI, the communication required between the branch controller 30 and the selected window machine to permit energizing the window machine keyboard solenoids (FIGS, 5 and 10b) i-@l accordance with respective digits OD3-ODI, and OD,3-OD17 of the output message segment. As indicated in FIG. 8, the next digits of significance which will be received from the central location are digits 3-11 (the second digit is blank) corresponding to the nine amount rows (FIGS. 3 and 3a) of the keyboard. The corresponding otitput di,@jt cou@its OD3-ODI, are fed throu.-h the output messa,@e @ates 230 to the rows of the keyboard solenoids (FIG. 5) which correspond to t-he nine amount rows (FIGS. 3 and 3a), Then, as each of the amount row di,-its appear at the output of the receiver and converter 311, they will be converted into decimal form by the binary to decimal converter 305 (FIG. 10b), and sent via output message gates 230 as sianals 01-09 to resp,-ctive coli-imns of the keyboard solen Olds to cause ener.-ization of respective keyboard solenoids (as previously explained in connecton with FIG. 5). Since the outputs of the binary to decimal converter 305 (FIG. 10b) and the output digit counter 352 (FIG. 10b) remain fixed between receipt of the digits, the delay between the transmissic)n of digits determines the period from the central location for which energization signals are applied to the respective keyboard solenoids. The transmission of digits of the input message by the ceiitral accounting location is thus appropriately delayed as necessary to provide sufficient time for the solenoids to be set by the;r respective en@-rgization signals. The next digit 12 (FIG. 8) received from the central accotinting location contains information as to the desired setting of the lamps 125 (FIGS. 3 and 9a) of the ,9,808,439 22 window machine. After passirig th.-ougli the output message gates 230, this twelfth di,,it is fed via AND gates 232 (FIG. 9b) (which are ener.-ized by di.-it count OD12) to the lamp memory 215 for appropriately setting lanips 5 125. The next digit 13 (FIG. 8) received froni the c,-ntril accounting location contains infoi,mation as to the t@,pe of automatic second cycle, if any, is to be initiated by the window machine after its first cycle is compieted. Sinc-. th'@ 10 s inforrdation is not ready t@o use by 'Lhe window machine at th-- time wberi it at)peai-s, it is s-,nt to suit-qble stora.-e 240 (FIG. 9b) activated in response to di.-it cotint OD13- The -@iext three cligits to be rec@,-'ved are digits 14-16 15 (FIG. 8) correspondiiig to cont,,,ol rows 4, 1 ind 2 (FIG, 3a), resp.-etivelv. The keyboard slo-@noids corresponding to these digits are energized in response to digit counts, OD,.,-OD,6 in the sarrie w@iy as those for the nine amount rows. 20 The next digit to be received is digit 17 corresponding to control row 3. Sirce energizing of its respective solenoid will cause the window n-iachine to cycle and print out on the ciistomer's passbook, it is desirable to hold off ener,@ization of its respective soleiioid Lintil the sum parity 25 digit (digit eighteen) is checked. This is accomplislied by storing digit seved.teen in suitabic storage 240 (along with digit 13) in response to d;git count OD17- The eighteenth and final digit of the oul@t)ut message se,,ment to be received is the parity di.-it wbich is fed 30 t6 a parity check circuit 356 (FIG. 10b), as are all of the other seve@-.iteen di,@its. The parity check circuit 356 checks the parity of each individual digit during OP, in response to each clock data s;gnal Cd, and checks the overall sum parity of the complete outplit message se-ment 35 when the parity stim digit arrives. If parity @hecks out fully when the clock d,@ita pulse Cd occurs durin.- digit count ODIB, then a true PARITY O.K. output pulse is pi-oduced by the parity check circuit 356; if parity does not check out, either on an i-tidividual digit or on the 40 longitudinal sum, then the parity cbeck circuit 356 prodlices a PARITY ERROR outptit pulse when Cl occurs darin,@ digit count OD,8. This PARITY ERROR ptilse is applied to the lamp memory 215 (FIG, 9a) via OR gate 281 and the outi)ut messa.@e -ates 230 to permit il- 45 lumiiiation of a suitat@e one of the wipdow machiqe larips (FIGS. 3 and 9a) so as to advise the teller that he sholild press the VOID key to remove any information which may have been set. up in the window niachine. Ther,- are fotir possibil;ties that can occur when the 50 data clock pulse Cd oectirs at di.-it count OD,8 of program count OPI. (a) If parity checks oiit so that a PARITY O.K. signal is produced by the parity check circuit 356, and if in additio-@i line OM, (FIG. 10b) -s trtie (as a result of the 55 ready for output switch 175 in FIG. 9b baving been closed to permit the output select flip-flop 255 to have turned on during digit count OD, of pro-ram county OPI), then, when the PARITY O.K. signal occurs during Ci of the last digit cotint OD,8, the output program counter 320 ro will advance tO OP,,.k.- It is to be noted that only line OM, of the selected window machiiie can be trle at Cd of OD,8, since only the corresponding select line OW, receives a triie signal during OD, of OP, in response to the scan position number represented by the first'digit of 65 the otitp,,Itmessage. (b) If parity does not check out so that a PARITY ERROR signal E is Produced when Cd occurs during OD,8, then the output pro@ram counter 320 will advance back to its rest program count OPo, as a result of which 70 the ou@put select flip-flop 255 (FTG. 9b) will be ttirned off to break communication between the branch controller 30 and the selected window machine 40. (e) If parity checks out, but the output select flid-flop 255 was not turned on because the ready for output switch 75 175 was open durin.- OD, of OP, (indicating that the

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27 4. Progi-aiii couiit OX9 During OX,, processor clock pulses CG are fed via AND -ate 439 and OR gate 441 (FIG. 11a) to the "fill" input of the buffer register 450 (FIG. Ila) to control the feeding o-f the eighteen digit input message segment (which includes all parity information), digit by digit, fro@m the processor to the buffer register 450 for stora,@e therein. The output of OR gate 452 is also fed to the di@it counter 445 (FIG. Ila) to advance the counter 445 flom its initial count DI and thereby keep cotint of the digits of the output message se,@ment as they arrive from the processor. The procassor clock pulse Cc, occurring when the digit counter reaches D,8 causes the last digit of the output message segment to be stored in the bi-iffer register 4,50, the digit counter 445 to be returned to its initial cotint DI, and the output prooram counter 420 to be advanced to program cotint OX3- 5. Pi-ogi-ani couizt 0,Y3 Durin.- pro.-ram count OX3, the ei..-hteen di.-it input message se.ament which is stored in the buffer register 450 durin.- program count OX, is fed out to the selected branch via gates 475 and 415 to the respective transmitter and converter 409 (FIG. Ilb) correspondin@ to the selected branch. An appropriate delay is provided between digits to give the selected window maebine solonoi,ds (FIGS. 5 and 9b) a sufficient t@me to set before the next digit is sent. The manner in which this is accor@-iplished during OX3, will now be described. The buffer register 450 is emptied di.ait by di,git for- transmission of the output messa,@e segment to the selected branch in response to trai-ismitter clo,-k pulses Ct applied to the "empty" input thereof via AND gate 449 (FIG. Ila) and OR @ate 452. However, AND gate 449 will be enabled to permit pulses Ct to pass

therethrotigh ,only when output signal Q -from one-shot 492 is true as a result of one-shot 492 being off. Normally one-shot 492 is off, -but is turned on for a predetermined time (makinQ false) whenever one of the di.-its D3 to DI, ard DI'4 to D,6, having a vali-ie other than zero is fed out from the -buffer register 450 (FIG. Ila) during OX3 for trans,mission to the selected branch. A non-zero di.@it is detected by a Tion-zero detector 491 whicti, iii response to a non-zero digit, produces an Gutput pulse 491a which is applied to one- shot 492 throu.-h AND @ate 497 if the lion-zero digit is D3-DII or D,47D,B. It will be understood that each lof the di.@its D3 to DI, and D,4 to DG, if not zero, will requl:re a setting of a respective keyboard solenoid. The one-sliot 1.92, N7iben turned on as just described, serves to provide, by its output sianal Q (which is false when one- shot 492 is on), a.n appropriate transmission delay sliitable to permit sufficient time for the setti@ig of keyboard solenoids. Oth--r digits are sent with the normal waitin@ time provided by the repetition rate of the traiismitter clock ptiises Ct. Althou,-h digits D,3 and D17 also involve keyboard solen@oids, no special delay is provided since they are applied to storage 240 (FIG. 9b) rather than directly to their respective solenoids. The output of AND gate 4d ,9 (FIG. Ila) is also applied, via OR -ate 452, to the digit counter 445 to pernait the digits to be counted as they are fed out, di,@it by digit, from th,,- buffer register 450 (FIG. Ila) and fed via gat-.s 475 and 415 (FIG. Ilb) to the transmitter ard converter 409 -of the selected branch. When transmitter clock pulse Ct occiirs during the last digit count Dla, the last di,@it of the eighteen di,@it output message se.-ment is fed olit of the buffer register 450 for transmission to the selected branch, the digit counter 445 is returned to its initial count Di, and the output program counter 47 ,O is advanced to program count OX,,. 6. P)-ogi-ai7i colitit OX, Durin.- program count OX4, the buff er 15 awaits receipt of -. signal from the selected branch as to whether or not 3,308,,1-39 28 the eighteen digit input message segme- @it was correctly received thereby. There are threepoissibilities. (a) If a MESSAGE O.K. signal is received by the buffer via the respective receiver and converter 411 (FIG. Ila), then a MESSAGE O.K. output line of a control character decod@-r 410a will become true to advance the -output pro..@ram counter 420 to prograni count OXI.K. (b) If a MESSAGE ERROR signal is received from the selected branch, then the MESSAGE ERROR output lo line of the control character decoder 410 will becz)ni-. true to advance the output program counter 420 to pro- @.ram count OXe- (c) If for any reason no message is received from the selected branch during OX4, then a timer 493 (FIG, I lb) 15 which is eiiergized during OX4 will run out and prodl]ce an output pulse 493a to also advance ,he output program counter 420 to OX,, which resets the timer 493. 7. Pi-ogi-a77i Coll'@lt OX..k. 20 Program COUnt OX..k. is fed to the processor to indicate that the output message segment was correctly received by the selected btanch. At the next following transmitter clock pulse Ct, the output program counter 420 is advanced back to its rest count OPO. 25 8. Pi-ogi-ai? 7 colti7t OX,, Program count OX, is fed to the processor to indicate that the output message segment was not properly received. The processor, therefore, retains the output mes- 30 sage segment and will not try to send it again for a- predetermined time. It is to be noted that both OX, and OXI.K. are fed to the "count" input of the scan counter. This is done so that when scanning resumes, the branch following the 35 one just handled will be scanned first. CONCLUSION While the foregoin@ disclosure bas been primarily concerned with a part'iciilar exemplary embodiment, it 40 is to be understood that the invention is susceptible of many modifications in construction and arrangement as well as a variety of related uses. For example, in the typical mechanization just described, provision could be made for a predetermined number of retries in the event - an error occurs, rather than immediately dispensing with 4a the message se,@ment pres-,ntly being handied. Also, many buffers 15 could be provided operating simultaneously instead of just a single buffer. Furthermore, the system may readily incorporate other types of on- line operations such as mort-age transactions, Christmas 5 cliib, and the like. The above examples of modiiications are, of course, only illustrative of many others that could be provided, The present invention, therefore, is not to be considered 55 as lin7ited to the specific disclosure provided herein, but is to be considered a,s including all modifications and variations coming within the scope of the invention as defined in the appended cla;ms. What is claimed is: 60 1. In an on-line banking system, a central accounting location and a plurality of branches cooperating therewith, said central accounting location having a data processor, a random access Linit providing a high capacity rapid access store for said processor, and at least one 65 bu-iter provided to control the flow of information between said data processor and a predetermined plurality of said branches, each of said branches including a plurality of inulti-row keyboard window machines, an associated unit for each window machine, and a branch 7 controller provided to control the flow of information between said window machines via their respective associated units and said c@-ntral accounting location, each branch controller including means for sequentially scanning said window machines ur@til olle is found which 75 is ready to have a keyboard entry read Olit therefrom in

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United States Patent Office 31308,439 3,308,439 ON-LINE SYSTEM Robert M. Tink, Redondo Beach, Robert A. Meinick, Los Angeles, and Frank B: Andrews, Jr., Gardena, Calif., assignors to The National Cash Register Com. pany, Dayton, Ohio, a corporation of Maryland Filed Jan. 2, 1964, Ser. No. 335,184 13 Claims. (Cl. 340-172.5) This invention relates generally to data processing systems and more particularly to tended for use in the banking field. In the past decade there has b@een an upsurge in the use of banking services with more depositors, more borrowers and more special services being provided by banks each year. In many cases, the paperwork relateon-line banking system. Obviously, if- uniiinited funds are available a highly sophisticated and very rapid system can be devised ih accordance with presently known techniques so as to provide an on-line banking system having all the capabihties and speed that a bank might desire. However, as always, cost is a vital consideration so that a practical system must necessarily be a compromise between cost and function. In accordance with the present invention an on-line system is provided which meets the important objectives of an on-line banking system at reasonable cost and with a minimum of required equipment and, in addition, provides a number of unique and highly advantageous features. Accordingly, it is a broad object of the present invention to provide an on-line banking system which achieves Patented Mar. 7, 1967 2 the important objectives of such a system at reasonable cost and with a minimum of equipment. Another object of the invention is to provide an on-line banking system which requires a minimum of storage at each branch of a multi-branch bank system. A further object of this invention is to provide, in accordance with any or all of the foregoing objects, an on- line banking system in which off-line operations can conveniently be handled in the event the data processor I o or the communication equipment associated therewith is not operating, and in which such off-line operations can conveniently be entered into the data processor at a later time for handling with previous or future on-line data. Still another object of the present invention is to pro- 15 vide, in accordance with any or all of the foregoing objects, an on-line bankina system which permits a reduction in the customer waiting time at the teller's window. vide a system, in accordance with any or all of the fore- Still another object of the present invention is to pro- 20 going objects, which prevents undetected errors from occurring either at the teller window machine or at the data processor. Yet another object of the present invention is to provide an on-line banking system, in accordance with any or all 25 of the foregoing objects, I in which the operations required of the teller are essentially the same during both on-line and off- line operations. A still further object of the present invention is to pro- 30 or all of the foregoing objects, in which errors will not be vide an on-line banking ssytem, in accordance wlth any rinted out on the customer's passbook. p Yet a further object of the present invention is to provid e an on4ine bnnking system, in accordance with any or all of the foregoing objects, in which previous unposted 35 inf<)rma@on (such as interest and no book transactions) caia be posted on the first presentation of the customer's passbook. StiR another object of the invention is to provide an on-line banking system, in accordance with any or all 40 of the foregoing objects, in which current balances and account conditions are made available to any teher's window. An additional object of the invention is

to provide an on-line banking system, in accordance with any or aR 45 of the foregoing objects, in which the required changes in the operation and construction of conventionally available window machines for use with the system are reduced to a minimum. Another object of the invention is to provide an on-' 50 line banking system, irL accordance with any or all of the foregoing objects, in which messages from either the window machine or the data processor are divided into convenient message. segments, these message segments being appropriately time-multiplexed by the system so as 55 to increase the speed capabilities thereof with a minimum of required information storage. A still further object of the invention is to provide an on-line banking system, in accordance with any or all of the foregoing objects, in which a variable trans- 60 mission rate capability is provided for information fed from the data processor to the bank branches so as to perrait slower operating mechanisms (such as are present in the window machine) to be satisfactorily operated, 65 while permitting faster operating devices to receive information at a faster rate, thertby providing a highe,r average operating speed for the system. Yet a further object of the present invention is to provide an on-line banking 'system, in accordanc,e with 70 any or all of the foregoing objects, in which a minimum of telephone lines are required between each bank branch and the bank's central accounting location.

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3 The specifle nature of the invention as well as other objects, advantages and uses thereof will become apparènt from the following description taken in conjunction with the accompanying drawings in which: FIG. I is a schematic overall view of a typical online banking system in accordance with the present in- vention; FIG. 2 illustrates a typical set up at a branch; FIG. 3 is a pictorial view of a typical window ma- chine; FIG. 3a is a view of the keyboard of the window machine of FIG. 3; FIG. 4 is a schematic electrical diagram - illustrating the keyboard switches incorporated in the window machine of FIG. 3 for use in reading out a keyboard entry; FIG. 5 is a schematic electrical diagram illustrating the keyboard solenoids incorporated in the windcyw machine of FIG. 3 for use in setting the keyboard in accordance with electrical signals derived from a data processor; FIG. 6 is a fragmentary cross-sectional view illustrating how the window machine of FIG. 3 may be provided with a double keyboard to permit operation of the window machine in a similar manner whether by an 6perator or by electrical signals derived from a data processor; FIGS. 7 and 8 respectively illustrate a typical format for input and output message segments transmitted between the central accounting location and each branch; I (wihich is constituted by FIGS. 9a and, 9b) mati 1, c e c electrical block and circuit diagram illus- is aT@@ traiilienganadly ical logical mech@inization ch s asso d nit; is constituted by FIGS. 10a and 10b) is a schematic electrical block and circuit diagram illustratina a typical logical mechanization of a-blinr-h FIG. II fwhich is constituted by FIGS. Ila and I lb) is a sc@hema@tic electrical block and circuit diagram illustrating a typical logical mechanization of a buffer_"e central accounting location. INTRODUCTION An overall schematic view of a typical on-line banking s stem in accordance with the present invention is illusItryated in FIG. 1. It will be seen that the system broadly comprises a central accounting location 10 communicatff -e- ing with a pMraTiTy of bank branc s 20 By means of telephone lines 20a. At the central accounting locat' ton 10, a data processor 12 is provided cooperating with a random access unit 13 which provides rapidly accessible- h-ig-Scap-acity storage for information concerning customer accounts. A u @@@5 is provided between the data processor 12 and the telephone lines 20a to control the flow of information between the bank branches 20 and the data processor 12. Whfle only three branches and one buffer 15 are shown in FIG. 1, it will be appreciated that additional branches and buffers could also be employed. Still referring to FIG. 1, it will be seen that at each of the bank branches 20, a pluraety of window machines 40 erve as the input-output point of origin device for each teller. Each window machine 40 is connected to a respective electronics unit 40a by means of which it is able to communicate with a branch controller 30. The branch controller 30 is in turn connected to its respective branch telephone lines 20a and serves to control communication between the window machines 40 at the

branches 20 and the buffer 15 at the central accounting location 10. FIG. 2 illustrates how the equipment at a branch may typically be set up. In the exemplary em-bodiment of the invention to be onsidered herein, there is essent age at the bnnch ther than thit pLQvided bv the win(fow machines themselves, and each bra gontrgllgLJO.-M- 3)308,439 4 mits only one window machine at -ti me-to-communicate 15 . The At, nt na*-Ga-time, the buffe can com her a selected-wia- -do-w--m-a-cEl-n-e--oTa selected brance, or with Ihe-daL%4ffllr_-es-so-r-rl,- Tu7-n-ot-Fo-tFat t@he s@ame time. Such restricti-o -ns--a-r-e--oT-c-o-n-si-de- r-aEFe-E-eFp in@redu@eing the system equipment and cost- requirements. As will hereinafter become evident, the present invention makes it possible to provide an efficient and sufficiently fast system despite these restrictions. ViMle various types and forms of equipmeiit can be employed in the on-line banking system of the presen invention, some exemplary equipment may be mentic"ed which are weH suited for use in various parts of the system. For exam-ple, the data processor 12 at the central accounting location 10 in FIG. 1 may be of the type disclosed in the commonly assigned copending patent application Serial No. 107,109, filed May 2, 1961, while the random access storage unit 13 in FIG. I may be of the type disclosed in the commonly assigned copending ap plications Serial No. 12,032 and Serial No. 162,626 ": spectively filed on March 1, 1960 and December 8, 1961.1 THE WINDOW MACHINE The window machine 40 indicated in FIGS. I and 2 is preferably of the type illustrated and described in 1'.' Patent No. 2,774,298, issued to Everett H ' Placke.et al: on December 18, 1956, which has long been used by a number of savings banks to record the deposits and withdrawals of their customers. Since this window machjpe is fully disclosed in the aforementioned patent, it will only be considered very generally herein, it being understood that the window machine of the present invention may be similarly provided, except for various modifications desirable for incorporation of the macbine into an on-line system. A typical manner in which these modifications may be provided is illustrated and disclosed in the copending commonly assigned U.S. patent applica- tion Serial No. 308,382, filed September 12, 1963. FIGS. 3 and 3a illustrate a window machine 40 of the type disclosed in the just mentioned copending application Serial No. 308,382. A sloping key-board 41 contains the nine rows of amounf'Eeys@l _the four rows of control keys 122, and-Mre-e groups of indicator-Lamps indicated IT723.-Beneath the keyboard 4T at-th-e fro@t-of the machine is a printin&AWAAi-to accommodate the customer's "-t- passbook.--7'o he left of the printing table 43 is another pria!@n t@ @@@l@@to accommodate the transaction siip 50-@@wEich is filled out by the customer prigr to stepping up to the teller's window. To the right of the printing table 43 in the window machine.is another printing mech. anism for printing on an audit strip which is visible through a window 45. This audit strip is retained in.the machine and all entries in the window machine are printed thereon for auditing purposes, while only selected entries are printed on the customer's passbook and the transaction slip. As in the aforementioned Placke et al. patent, the window machine also includes an add-subtract total- izer which allows the printing of proper balances, whether they -be positive or negative, or whether a deposit or a withdrawal is being- entered. More recent window machines of the general type dis closed in the aforementioned patent have provision 6,3 permit information entered into the keyboard to be el tronically scanned to cause a paptLla=_Io be punc in response thereto. This is a rell- knowj@feature of m types of accounting machines and may- advantageou be employed in the present invention to permit read out of information entered into the window macwne. A typical manner in which this is accomplished is schematically illustrated in FIG. 4 in which each keyboard switch Blustrated therein corresponds to a respective key in the keyboard 41 of FIGS. 3 and 3a; only the first two rows and the last row of keyboard switches are shown in

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